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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/056,611

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Shiro Sakai

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10/07/2002

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EXAMINER

NGUYEN, THANH T

ART UNIT

PAPER NUMBER

2813

DATE MAILED: 10/07/2002

7

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/056,611

Applicant(s)

SAKAI, SHIRO

Examiner

Thanh T. Nguyen

Art Unit

2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 02 July 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) 10-14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 January 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Election/Restriction***

Applicant's election without traverse of claims 1-9 of group II invention, in Paper No. 5 is acknowledged. Claims 10-14 are withdrawn from further consideration.

### ***Information Disclosure Statement***

The information disclosure statement filed June 14, 2002 has been considered. The PTO-1449 attached thereto has been initialized to indicate consideration of the references and is attached to this paper.

### ***Oath/Declaration***

Oath/Declaration filed on January 24, 2002 has been considered. It is noted that foreign priority has not been claimed.

### ***Specification***

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: "A method for manufacturing gallium nitride compound semiconductor element".

*Claim Objections*

Claim 2 is objected to because of the following informalities:

Changing “the bonded structure” in claim 2, line 3 to “bonded structure” is suggested.

Changing “H” to “hydrogen” in claim 2, line 4 is suggested to provide clarity.

Appropriate correction is required.

*Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 7 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 7, line 1, the term “light” lacks clear antecedent basis. Change to “electromagnetic radiation” is suggested.

*Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

Claims 1-9 are rejected under 35 U.S.C. 102(e) as being anticipated by Tsai et al. (US Patent No. 6,429,102).

Tsai et al. discloses a method of manufacturing a GaN compound semiconductor element, which includes:

a) forming, on a substrate (22, see col. 4, lines 60-61 and figure 4), an N type GaN compound semiconductor layer (26, col. 4, lines 60-67) and a GaN compound semiconductor layer which includes a P type impurity (30, col. 5, lines 1-2),

b) irradiating electromagnetic radiation (called microwave radiation at 2.45 GHz, 560 W, in Tsai et al. col. 5, lines 5-9) onto the GaN compound semiconductor layer which includes a P type impurity (30, col. 5, lines 1-2),

In regarding to claim 2, the microwave radiation (inherent an electromagnetic radiation, at 2.45 GHz) having a wavelength is absorbed by bonded structure of P type and H atom (P-type Mg-doped GaN layer is treated with microwave to convert the high resistivity P-type compound semiconductor layer to a low resistivity P-type compound semiconductor layer such that hydrogen escape from complex (bond) due to absorption of microwave energy, see col. 3, lines 41-45, col. 4, lines 44-56, col. 2, lines 53-57, col. 5, lines 7-9 and col. 6, lines 45-53),

In regarding to claim 3, heating the substrate during irradiation (see col. 5, lines 4-5),

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In regarding to claim 4, forming a buffer layer (24, see figure 4, col. 4, lines 60-67 and col. 5, lines 1-2) on the substrate (22), forming an N type GaN compound semiconductor layer (26, see figure 4, col. 4, lines 63-64) on the buffer layer (24), forming a P type GaN compound semiconductor layer (30) on the N type GaN compound semiconductor layer (26, see figure 4, col. 4, lines 60-67 and col. 5, lines 1-2),

In regarding claims 5, 6 and 9, forming a buffer layer (44, see figure 5, col. 5, lines 30-48) on the substrate (42), forming an P type Mg-doped GaN compound semiconductor layer (50, see col. 5, lines 33-35) on the buffer layer (44), forming an N type Si-doped GaN compound semiconductor layer (46, see col. 5, lines 44-46) on an P type GaN compound semiconductor layer (50),

In regarding to claims 7 and 8, the electromagnetic radiation (or light, note: antecedent problem as rejected above) having a wavelength greater than 4.5  $\mu\text{m}$  (0.122m, microwave at 2.45GHz) and an intensity greater than 0.01mw/mm<sup>2</sup> ( $3.5 \times 10^8$  mw/mm<sup>2</sup> with 560W at 4 $\mu\text{m}^2$  thick N or P type GaN layer, see col. 4, lines 63 and col. 5, lines 33-38).

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh Nguyen whose telephone number is (703) 308-9439. The examiner can normally be reached on Monday-Thursday from 7:00 am to 5:30 pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, can be reached on (703) 308-4940. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

A handwritten signature in black ink, appearing to read 'Thanh', with a long horizontal flourish extending to the right.

Thanh Nguyen  
Patent Examiner  
Patent Examining Group 2800

TTN  
October 1, 2002